

TECHNICAL NOTES

STATE OFFICE	STILLWATER, OKLAHOMA 74074
ENGINEERING TECHNICAL REFERENCES	FOR IN SERVICE ONLY

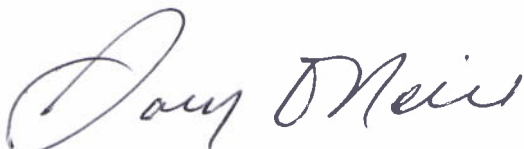
August 29, 2014

ENGINEERING – OK-8 (Rev.)

Re: Control of Trees and Brush on Dams

This technical note provides guidance and general recommendations for controlling trees and heavy brush on earthen dams. The policy of the Natural Resources Conservation Service and Oklahoma Water Resources Board requires that dams (including the auxiliary spillway area) be kept free of trees and brush.

Uncontrolled tree and brush growth create many potential problems that can adversely affect the performance and integrity of a dam during its design life (up to 100 years). This technical note describes methods for prevention of tree and brush growth and recommendations for removal of established trees.



GARY L. O'NEILL
State Conservationist

Control of Trees and Brush on Dams

Potential Problems Caused by Trees Growing on Dams

Although small trees on dams appear to be harmless, they must be removed before they are allowed to get larger where they can cause serious problems to the dam and when the cost of removal is much higher. Some areas of the embankment are much more susceptible to problems caused by trees; for example, auxiliary spillways and crowns of dams constructed with materials that are dispersive or susceptible to drying cracks are of particular concern.



The following is a summary of the many potential problems that can be caused by trees growing on various sections of a dam:

A. Waterline

1. visual masking of serious erosion of the front slope
2. damage to the principal spillway conduit due to tree root interception
3. reduction in the hydraulic performance of the principal spillway due to limb blow down or plugging of the inlet
4. fence damage from blow down permitting overgrazing and eventually erosion of the front slope
5. damage to desirable vegetation by trees and heavy brush which reduce the available moisture and compete for space

B. Front Slope, Crown and Upper Two-Thirds of the Back Slope

1. piping or seepage paths caused by the decay and deterioration of larger roots after the tree has been cut or died
2. exposure of unstable, dispersive soils due to root deterioration
3. drying cracks and seepage around tree roots in the narrow section of the dam (top five feet)
4. clogging of the embankment or foundation drainage system by tree roots
5. damage to desirable vegetation by trees and heavy brush which reduce the available moisture and compete for space
6. damage from digging or burrowing animals who are attracted to the trees or heavy brush
7. possible severe erosion due to turbulence if a dam happens to overtop

C. Lower One-Third of the Back Slope, Toe and 20 feet Beyond

1. development of a seepage path along roots that intercept drainage outlets or phreatic surfaces
2. clogging of the embankment or foundation drainage system by tree roots
3. visual masking of serious seepage problems at or near the back toe

D. Auxiliary Spillways

1. erosion during spillway flow due to turbulence
2. reduction in the capacity of the auxiliary spillway

Tree and Brush Prevention

The best method for prevention of tree and brush growth is regular mowing of the dam and auxiliary spillway. If this is not practical, new trees and brush should be cut every 2 – 3 years. Eight inches diameter at breast height (DBH > 8") is considered to be the tree size where the root system may start to be significant. Once trees reach this size, cutting off at the ground is not recommended in most instances and mechanical removal of at least a portion of the root system is needed.

Other options for prevention of large tree and brush development include the use of herbicides, prescribed burns, biological and various mechanical methods. These are well described in the Oklahoma NRCS Brush Management (314) standard, and Range Technical Note OK-17 – Brush Management Options for Grazing Lands. All of these can be found in the eFOTG. Additional information may be available through OSU Extension Agents. Some of the mechanical methods described may not be suited for dams due to the steep slopes.

Tree Removal Recommendations

Tree removal recommendations take into account the size of trees (DBH), the density of trees and their location on the dam. Tree density is defined as “light cover” or “heavy cover”. Isolated or scattered trees where there are no more than 2 – 3 trees per 400 square feet would be described as “light cover”. Clumps or continuous tree growth are considered “heavy cover.”

In most instances, where there is a light cover of trees with DBH < 8”, the recommendation would be to cut the tree approximately 6” below ground (to eliminate the hazard of any surface obstruction) and to kill the root.

- a. Trees located along the waterline may be removed by cutting and killing the stump as described above. Occasionally, small shrubs or trees such as buttonbush or sandbar willows may be planted at the waterline for wave protection. If this is the case, they need protection from herbicide applications. These plants should not be allowed to grow unchecked, but maintained at an approximate height of 4 feet.
- b. Trees located from the front slope to 20 feet beyond the back toe with a DBH > 8” shall have the larger main roots and the majority of the intermediate and smaller roots removed to a depth of 18 inches for an area equal to $\frac{1}{2}$ the diameter of the canopy. Exposed roots shall be poisoned using an approved poison applied according to the manufacturer’s recommendations (see the eFOTG references listed in the previous section). The soil material used to backfill the void shall be of equal or better quality as the surrounding material except in suspected dispersive soils, the backfill material must be sandy, nonplastic soil or soils chemically treated to protect against dispersion. Compactive effort needs to be applied to the backfill so the density is approximately the same as the surrounding material. The disturbed area must be revegetated and fertilized.

Trees in this area with a DBH < 8” shall be treated in the same manner except that the depth of removal may be reduced to 12 inches.

- c. Trees located within the auxiliary spillway shall be removed by cutting and killing the stump as described above.

The above are only general recommendations. On high hazard dams, or dams of a very heavy infestation of large trees, it is recommended that an engineer be consulted to make specific recommendations.